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EXAMINER

TSANG FOSTER, SUSY N

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 10/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

AS-14

Office Action Summary	Application No. 10/034,316	Applicant(s) TSUKAMOTO, HISASHI	
	Examiner Susy N Tsang-Foster	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 17-23 is/are rejected.
- 7) ☒ Claim(s) 16 and 24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 10.5, 13. 6) ☐ Other:

DETAILED ACTION

Response to Amendment

1. This Office Action is responsive to the amendment filed on 02 June 2003. Claims 10, 13, 17, 18, 20, and 22 have been amended. Claim 24 has been added. Claims 1-24 are pending. Claims 16 and 24 are objected to. Claims 1-15 and 17-23 are finally rejected for reasons given below.

Information Disclosure Statement

2. The information disclosure statements (IDS) submitted on 4/14/2003 and 6/3/2003 have been considered by the Examiner.

Specification

3. The amendment filed 02 June 2003 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

On page 15 of the specification, adding the statement "[a]fter filling the casing at least partially with the non-aqueous electrolyte solution, the energy storage device may be charged either before or after adding the flame retardant material to the casing" constitutes new matter.

In contrast to applicant's assertions on page 12 of the amendment, original claim 17 does not support this limitation.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 14, 15, and 17 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for perfluoro-1,3-dimethylcyclohexane and $C_{15}F_{33}N$ as the halogen compound that is a flame retardant material that is liquid at room temperature and pressure and substantially immiscible in the non-aqueous electrolyte solution, does not reasonably provide enablement for all halogen containing compounds that are flame retardant materials that are liquid at room temperature and pressure, substantially immiscible in the nonaqueous electrolyte solution, and contain at least one member selected from the group consisting of branched or unbranched alkyl, cyclic alkyl, ether, aminoalkyl, perfluoroalkyl groups, perfluoroaminoalkyl groups, and pefluoroether groups, and aliphatic heterocyclic compound groups in which one or more hydrogen atoms are substituted by a halogen selected from the group consisting of fluorine, chlorine, and bromine. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims.

The specification provides only the above 2 examples of halogen containing compounds that are flame retardant materials that are liquid at room temperature and pressure, and substantially immiscible in the nonaqueous electrolyte solution. It would be undue

Art Unit: 1745

experimentation to one of ordinary skill in the art to determine what halogen containing compounds are encompassed by the claims that contain branched or unbranched alkyl, cyclic alkyl, ether, aminoalkyl, perfluoroalkyl groups, perfluoroaminoalkyl groups, and pefluoroether groups, and aliphatic heterocyclic compound groups in which one or more hydrogen atoms are substituted by a halogen selected from the group consisting of fluorine, chlorine, and bromine that are flame retardant materials that are liquid at room temperature and pressure, and substantially immiscible in the nonaqueous electrolyte solution . The specification does not provide sufficient guidance as to what halogen compounds would contain the groups cited in the Markush group above and are flame retardant materials that are liquid at room temperature and pressure, and substantially immiscible in the nonaqueous electrolyte solution.

6. Claim 18 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 18, the limitation "the steps of charging the energy storage device after filling the casing at least partially with the non-aqueous electrolyte solution and before adding the flame retardant material to the casing" is not in the original disclosure. In contrast to applicant's assertions on page 12 of the amendment, original claim 17 does not support this limitation.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1- 9, 11-15, 20, 21 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Narang et al. (US 5,830,600) and as evidenced by Galden PFPE:Heat Transfer Fluids Product Data Sheet for Galden ® HT90 Fluid pp. 1-3 (obtained [online]. Solvay Solexis, Inc., 2002 [retrieved on 2003-02-23]. Retrieved from the Internet : <URL: www.solvaysolexis.com/pdf/gald_heat.pdf>) and Data sheet for Ethylene Carbonate obtained from Chemfinder.com (obtained [online]. CambridgeSoft Corporation, 2003 [retrieved on 2003-02-23]. Retrieved from the Internet: <URL: www.chemfinder.cambridgesoft.com/result.asp>).

Narang et al. disclose a battery comprising a lithium metal anode, a LiMn_2O_4 cathode and a fire-retardant electrolyte composition comprising perfluoropolyether Galden ® HT90 (formula weight=460) and ethylene carbonate (col. 22, lines 25-35) in a 1:1 volume ratio and lithium bis(trifluoromethane-sulfonate) imide as the electrolyte salt (col. 20, lines 50-60).

The Galden PFPE:Heat Transfer Fluids Product Data Sheet for Galden ® HT90 Fluid shows that the perfluoropolyether Galden ® HT90 is a fluid that is not substantially miscible

Art Unit: 1745

with water (see page 2) where the solubility of water is 14 ppm. The data sheet also shows that the density of the fluid is 1.69 g/cm^3 at room temperature (see page 2).

Furthermore, the lithium salt in the fire retardant electrolyte composition may also be Li-A where A is an anion selected from the group consisting of Cl, CF_3SO_3 , ClO_4 , BF_4 , Br, I, SCN, AsF_6 , $\text{N}(\text{CF}_3\text{SO}_2)_2$, PF_6 , SbF_6 , $\text{O}(\text{CO})\text{R}'$ where R' is H, alkyl, aryl, alkenyl, halo, and haloalkyl, and the solutions of the lithium salt in fire retardant solvents are prepared to achieve approximately 0.2 M to 2.0 M lithium (col. 10, lines 17-27).

It is noted that applicants interchangeably used the weight percentage of the halogen compound based on either the weight of the electrolyte solution (page 17, lines 3-9 of the specification) or the weight of the nonaqueous solvent as claimed. It appears from the example given on page 17 of the specification that the basis of the weight percentage for the halogen compound is the weight of the electrolyte solution, not the weight of the nonaqueous solvent.

The data sheet for ethylene carbonate shows that the density of ethylene carbonate is 1.321 g/cm^3 . When the concentration of the lithium salt $\text{LiN}(\text{CF}_3\text{SO}_2)_2$ is 2.0M in Example 16 (see col. 22, lines 25-35), calculations show that the weight percentage of the halogen containing compound is 40.6% by weight based on the weight of the electrolyte solution.

In addition, a high dielectric solvent such as ethylene carbonate, propylene carbonate, dimethyl carbonate, diethyl carbonate, dipropyl carbonate, and mixture thereof may be used in the fire-retardant electrolyte composition (col. 11, lines 39-44).

Finally, anodes and cathodes of the battery may be fabricated from materials that are commonly used in primary and/or secondary batteries (col. 12, lines 42-44). The anode may be lithium metal, a carbon based material, and intercalating metal oxides and the cathode may be

Art Unit: 1745

lithium containing materials such as LiCoO_2 , LiMn_2O_4 , LiNiO_2 , V_6O_{13} , MnO_2 , and FeS_2 (col. 12, lines 42-51).

9. Claims 1- 9, 11-15, 20, 21 and 23 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by JP 10-012272 A (JPO Machine Translation).

See claims 1-6, and paragraphs 4-6, 13, 14, 17, 18, 20, 21, 24-31, and 42-44 of the JPO machine translation of the reference.

10. Claims 1- 9, 11-15, and 20-23 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Arai (US 6,210,835 B1).

See col. 3, lines 48-52; col. 4, lines 7-67; col. 5, line 14 to col. 6, line 64; col. 7, lines 6-42; col. 8, lines 1-8; col. 8, lines 20-50; Table 2, col. 14, lines 55-60 of the reference.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Narang et al. (US 5,830,600) and as evidenced by Galden PFPE:Heat Transfer Fluids Product Data Sheet for Galden ® HT90 Fluid pp. 1-3 (obtained [online]. Solvay Solexis, Inc., 2002 [retrieved on 2003-02-23]. Retrieved from the Internet : <URL: www.solvaysolexis.com/pdf/gald_heat.pdf>) and

Art Unit: 1745

Data sheet for Ethylene Carbonate obtained from Chemfinder.com (obtained [online].

CambridgeSoft Corporation, 2003 [retrieved on 2003-02-23]. Retrieved from the Internet:

<URL: www.chemfinder.cambridgesoft.com/result.asp>).

Narang et al. disclose all the limitations of claim 18 (see above) except filling the battery case at least partially with non-aqueous electrolyte solution, waiting a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing, and wherein the step of charging the energy storage device occurs after filling the casing at least partially with the nonaqueous electrolyte solution and before adding the flame retardant material to the casing.

Instead, Narang et al. disclose impregnating the resin separator and the cathode with the flame retardant electrolyte composition prior to inserting the electrode assembly into the casing (col. 17, lines 15-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to charge the energy storage device when the anode active material used is a carbon based material and the cathode active material is a lithium containing materials such as LiCoO_2 , LiMn_2O_4 , LiNiO_2 , V_6O_{13} , MnO_2 , and FeS_2 (col. 12, lines 42-51) after including the flame retardant electrolyte composition into the battery because the charging process is necessary to intercalate the anode with lithium from the cathode prior to using the battery as a portable energy source.

It would have also been obvious to one of ordinary skill in the art at the time the invention was made to add the nonaqueous electrolyte solution to the casing and wait for a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores

Art Unit: 1745

of the electrode assembly and then adding the flame retardant material to the casing, and then charging the energy storage device after filling the casing at least partially with the nonaqueous electrolyte solution and before adding the flame retardant material to the casing instead of adding the nonaqueous electrolyte solution containing the flame retardant material to the casing in one step and charging the energy storage device after adding the flame retardant electrolyte composition because the courts have held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results, In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

13. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-012272 A (JPO Machine Translation).

The JPO machine translation of JP 10-012272 A discloses all the limitations of claim 18 (see above) except filling the battery case at least partially with non-aqueous electrolyte solution without the flame retardant halogen containing compound, waiting a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing, and charging the energy storage device after filling the casing at least partially with the nonaqueous electrolyte solution but before adding the flame retardant material to the casing. The JPO machine translation of JP 10-012272 A discloses adding the nonaqueous electrolyte solution containing the flame retardant halogen containing compound to the battery casing (see paragraph 42 of the machine translation). The JPO machine translation of JP 10-012272 A also discloses that the battery is

Art Unit: 1745

charged after adding the nonaqueous electrolyte solution (see paragraph 44 of machine translation).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the nonaqueous electrolyte solution to the casing and wait for a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing and charging the energy storage device after filling the casing at least partially with the nonaqueous electrolyte solution but before adding the flame retardant material to the casing instead of adding the nonaqueous electrolyte solution containing the flame retardant material to the casing in one step and then charging the battery after adding the electrolyte solution because the courts have held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results, In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

14. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arai (US 6,210,835 B1).

Arai discloses all the limitations of claim 18 (see above) except filling the battery case at least partially with non-aqueous electrolyte solution without the flame retardant halogen containing compound, waiting a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing, and charging the energy storage device after filling the casing at least partially with the nonaqueous electrolyte solution but before adding the flame retardant material to the casing.

Art Unit: 1745

Instead, Arai discloses adding the nonaqueous electrolyte solution containing the flame retardant halogen containing compound as the final electrolyte solution to the battery casing (col. 14, lines 55-61).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to charge the energy storage device when the anode active material used is a carbon based material or a tin oxide and the cathode active material is a lithium composite oxide (col. 12, lines 42-51) after including the flame retardant electrolyte composition into the battery because the charging process is necessary to intercalate the anode with lithium from the cathode prior to using the battery as a portable energy source.

It would have also been obvious to one of ordinary skill in the art at the time the invention was made to add the nonaqueous electrolyte solution to the casing and wait for a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing, and wherein the step of charging the energy storage device occurs after filling the casing at least partially with the nonaqueous electrolyte solution and before adding the flame retardant material to the casing instead of adding the nonaqueous electrolyte solution containing the flame retardant material to the casing in one step and charging the energy storage device after adding the flame retardant electrolyte composition because the courts have held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results, In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

Art Unit: 1745

15. Claims 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Narang et al. (US 5,830,600) and as evidenced by Galden PFPE:Heat Transfer Fluids Product Data Sheet for Galden ® HT90 Fluid pp. 1-3 (obtained [online]. Solvay Solexis, Inc., 2002 [retrieved on 2003-02-23]. Retrieved from the Internet : <URL: www.solvaysolexis.com/pdf/gald_heat.pdf>) and Data sheet for Ethylene Carbonate obtained from Chemfinder.com (obtained [online]. CambridgeSoft Corporation, 2003 [retrieved on 2003-02-23]. Retrieved from the Internet: <URL: www.chemfinder.cambridgesoft.com/result.asp>).

Narang et al. disclose all the limitations of claims 17 and 19 (see above) except filling the battery case at least partially with non-aqueous electrolyte solution, waiting a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing.

Instead, Narang et al. disclose impregnating the resin separator and the cathode with the flame retardant electrolyte composition prior to inserting the electrode assembly into the casing (col. 17, lines 15-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the nonaqueous electrolyte solution to the casing and wait for a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing instead of adding the nonaqueous electrolyte solution containing the flame retardant material to the casing in one step because the courts have held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results, In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

Art Unit: 1745

16. Claims 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-012272 A (JPO Machine Translation).

The JPO machine translation of JP 10-012272 A discloses all the limitations of claims 17 and 19 (see above) except filling the battery case at least partially with non-aqueous electrolyte solution without the flame retardant halogen containing compound, waiting a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing.

The JPO machine translation of JP 10-012272 A discloses adding the nonaqueous electrolyte solution containing the flame retardant halogen containing compound to the battery casing (see paragraph 42 of the machine translation).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the nonaqueous electrolyte solution to the casing and wait for a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing instead of adding the nonaqueous electrolyte solution containing the flame retardant material to the casing in one step because the courts have held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results, In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

17. Claims 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arai (US 6,210,835 B1).

Art Unit: 1745

Arai discloses all the limitations of claims 17 and 19 (see above) except filling the battery case at least partially with non-aqueous electrolyte solution without the flame retardant halogen containing compound, waiting a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing.

Instead, Arai discloses adding the nonaqueous electrolyte solution containing the flame retardant halogen containing compound as the final electrolyte solution to the battery casing (col. 14, lines 55-61).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the nonaqueous electrolyte solution to the casing without the flame retardant and wait for a period of time sufficient for the non-aqueous electrolyte solution to penetrate one or more pores of the electrode assembly and then adding the flame retardant material to the casing instead of adding the nonaqueous electrolyte solution containing the flame retardant material to the casing in one step because the courts have held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results, In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

Response to Arguments

18. Applicant's arguments filed 02 June 2003 have been fully considered but they are not persuasive.

In regards to claims 14 and 17 rejected under 35 USC 112 first paragraph for the specification being enabling for perfluoro-1,3-dimethylcyclohexane and C₁₅F₃₃N, and that the

Art Unit: 1745

specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims, applicant asserts that one of ordinary skill in the art would know how to determine whether a chemical compound is a flame retardant material, either by testing safety of a completed battery and that mixing the flame retardant material with various possible nonaqueous electrolyte solution to test for immiscibility do not constitute undue experimentation for one of ordinary skill in the art. Applicant acknowledges on page 12 of the amendment that the Examiner unintentionally left out claim 15 in this rejection in the previous office action. Claim 17 is appropriately rejected since claim 17 depends alternatively on claim 14.

In response, the Examiner is not persuaded that it would not be undue experimentation for one of ordinary skill in the art to determine what halogen containing compounds are encompassed by the claims that contain branched or unbranched alkyl, cyclic alkyl, ether, aminoalkyl, perfluoroalkyl groups, perfluoroaminoalkyl groups, pefluoroether groups, or aliphatic heterocyclic compound groups in which one or more hydrogen atoms are substituted by a halogen selected from the group consisting of fluorine, chlorine, and bromine that are flame retardant materials that are also liquid at room temperature and pressure, and substantially immiscible in a nonaqueous electrolyte solution .

There are more than thousands, if not millions of compounds that are halogen containing compounds that contain branched or unbranched alkyl, cyclic alkyl, ether, aminoalkyl, perfluoroalkyl groups, perfluoroaminoalkyl groups, pefluoroether groups, or aliphatic heterocyclic compound groups in which one or more hydrogen atoms are substituted by a halogen selected from the group consisting of fluorine, chlorine, and bromine. One has to

Art Unit: 1745

determine from these innumerable halogen containing compounds which are flame retardant materials followed by determining which of these innumerable possibilities are liquid at room temperature and would be immiscible with a numerous variety of nonaqueous solvents. Such a process of determination by one of ordinary skill in the art as to what halogen containing compounds are intended to be claimed by applicants is undue burden.

With regard to the art rejections based on Narang et al., applicant asserts that perfluoropolyether GALDEN HT90 is a fluid that is not substantially miscible with water and that in the present invention, the electrolyte solution is nonaqueous and the flame retardant material is substantially immiscible with the nonaqueous electrolyte solution and the flame retardant material that is not substantially miscible with water does not indicate that it is not substantially miscible with the nonaqueous electrolyte solution.

In response, the nonaqueous electrolyte solution of Narang et al. is a polar aprotic organic solvent such as ethylene carbonate, propylene carbonate, dimethyl carbonate, diethyl carbonate, dipropyl carbonate (col. 11, lines 39-44). Water is a polar solvent. Since the perfluoropolyether GALDEN HT90 is immiscible with water which is a polar solvent, it is expected to be immiscible with the polar aprotic organic solvent of Narang et al. Applicants have not provided experimental evidence that the perfluoropolyether GALDEN HT90 is miscible with the electrolyte solution of Narang et al. Furthermore, applicant states on page 12 of the specification and in claims 15 and 17 that the halogen containing compound is a perfluoroether compound. Perfluoropolyether GALDEN HT90 is a perfluoroether compound.

Art Unit: 1745

With regard to the art rejections based on JP 10-012272 A, applicant asserts that the electrolytic solution contains the fluorine ether and that if the fluorine ether is the flame retardant material, then the flame retardant material must not be substantially immiscible in the nonaqueous electrolyte solution because it would not form a solution if it were immiscible.

In response, it is noted that the instant claims are drawn to an electrolyte system comprising the flame retardant material that is not miscible with the nonaqueous electrolyte solution. If the flame retardant material is not miscible with the nonaqueous electrolyte solution, it is not associate with the nonaqueous electrolyte solution in any physical way and therefore, it would seem inappropriate for the flame retardant material to be claimed as part of an electrolyte system. Although the electrolytic solution contains the fluorine ether flame retardant in JP 10-012271 A, the reference is silent about whether there is phase separation between the different components in the nonaqueous electrolyte solution. It is noted that applicant claims a halogen-containing compound containing an ether group or perfluoroether group as the flame retardant that is substantially immiscible in the non-aqueous electrolyte solution (see claims 14 and 15 specifically).

Applicant also has not commented on the flame retardant material comprising the chemical formula $F(CF_2)_aF$ where a is 5-8 disclosed JP 10-012272 A (see paragraph 24 of machine translation). It is noted that for the flame-retardant material comprising the chemical formula $F(CF_2)_aF$ where a is 5-8 (see paragraph 24 of machine translation for JP 10-012272A), the formula reduces to C_8F_{18} when a is 8 which differs the molecular formula for the claimed flame retardant, perfluoro-1,3-dimethylcyclohexane (C_8F_{16}), by 2 fluorine atoms. The solubility

Art Unit: 1745

properties of C_8F_{18} in the nonaqueous solvent is expected to be similar to the solubility properties of C_8F_{16} in the nonaqueous solvent.

Furthermore, applicant has not experimentally determined that all of the flame retardant materials encompassed by the chemical formulas disclosed in JP 10-012272 A are miscible with all the possible nonaqueous electrolyte solutions disclosed in JP 10-012272 A.

With respect to the art rejections based on Arai of record, applicant asserts that the reference states that the non-aqueous liquid electrolyte comprises a mixed solution of an ion nonconductive solvent and a lithium ion conductive solvent and that the nonconductive solvent is the non-flammable solvent and that if the non-flammable solvent were substantially immiscible in the lithium ion conductive solvent, they would not form a "mixed solution".

In response, the Arai discloses the definition of a mixed solution to mean that the non-flammable solvent can be mixed with the ion conductive solution in a dispersed state which means that the non-flammable solvent is immiscible with the ion conductive solution (col. 4, lines 7-15 of Arai). The definition of miscible is "capable of mixing in any ratio without separation of two phases" according to Merriam Webster's Collegiate Dictionary, 10th edition, Springfield: Merriam-Webster (1997). The non-flammable solvent of Arai is not capable of mixing in any ratio with the ion conductive solution without the separation of two phases. A dispersion has two phases. Two liquids that are miscible would not form a dispersion.

Art Unit: 1745

With respect to claims 17-19, applicant asserts that new and desirable results are obtained by selecting the order of the steps and that there is no teaching or motivation to add the flame retardant solvent of Narang et al. after adding the other electrolyte components to the battery case.

In response, the courts have held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results, In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Applicant has not provided the new or unexpected results.

Allowable Subject Matter

19. Claims 16 and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

Art Unit: 1745


CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (703) 305-0588. The examiner can normally be reached on Monday through Friday from 9:30 AM to 7:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (703) 308-2383. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900.

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

st/ 

Susy Tsang-Foster
Primary Examiner
Art Unit 1745